Evaluation and Calculation of Elastic Scattering Cross Sections for Ion Beam Analysis

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The needs of the Ion Beam Analysis (IBA) community in charged particle nuclear data are reviewed. There are different IBA methods based on registration of elastically scattered particles or the products of nuclear reactions and a reliable source of cross section is needed for all of them except for Rutherford backscattering for which the cross section can be calculated according to the known formula. To provide charged particles cross sections for IBA is a task that resembles the problem of nuclear data for the majority of other applications in all respects save one - differential cross sections rather than total ones are needed for IBA. The present status of the nuclear data for IBA is analyzed. The problems which should be resolved in order to establish a reliable basis for the IBA analytical work are discussed.

Recent results obtained in the evaluation of proton elastic scattering cross sections for magnesium and sulphur and for ^{4}He scattering from oxygen are presented. The present status of the SigmaCalc software developed for the IBA scientists having no expertise in nuclear physics to perform the calculations of the required differential cross sections is discussed. The ways to provide the IBA community with a reliable source of nuclear data are outlined.

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